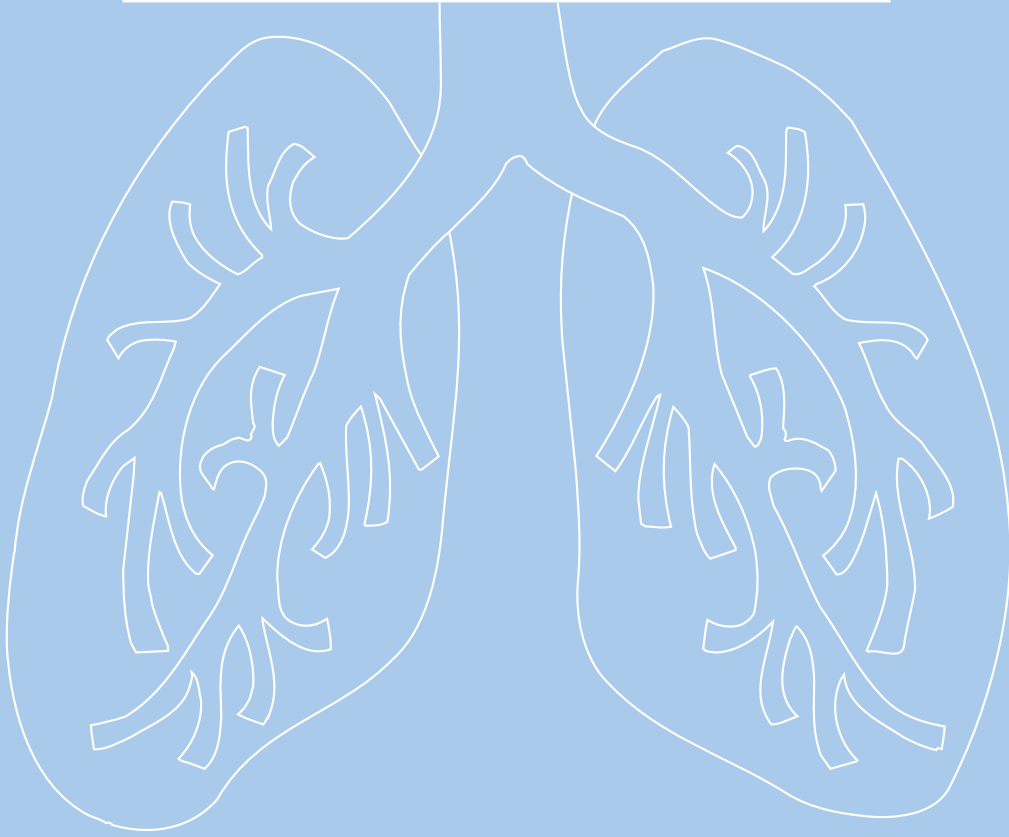


Natural History



Asthma Symptoms

Key symptoms

- Coughing
- Wheezing
- Shortness of breath or rapid breathing
- Chest tightness

Associated symptoms

- Fatigue: the child may slow down, stop playing, become easily irritated.
- The young child may say that his/her chest “hurts” or “feels funny.”
- Infants may have difficulty feeding and may grunt during sucking.
- Older children may avoid certain activities (e.g., sports, sleep-overs).

Natural History

Who gets asthma?

Asthma often begins in childhood.

- 50% to 80% of children with asthma develop asthma symptoms (coughing, wheezing, shortness of breath or rapid breathing, chest tightness) before 5 years of age.
- Factors associated with **onset** of asthma symptoms in children:
 - ⇒ Allergy
 - ⇒ A family history of asthma and/or allergy
 - ⇒ Perinatal exposure to tobacco smoke
 - ⇒ Viral respiratory infections
 - ⇒ Smaller airways at birth and in early life
 - ⇒ Male gender
 - ⇒ Low birth weight



Which children develop persistent asthma?

- In infants and young children who wheeze with viral upper respiratory infections (URIs), different patterns of illness may emerge over time.
 - ⇒ Symptoms may remit in the preschool years.
 - ⇒ Asthma symptoms may persist throughout childhood.
- There are no clear markers to predict the prognosis for an individual child.
- Factors associated with continuing asthma:
 - ⇒ Allergy
 - ⇒ A family history of asthma and/or allergy
 - ⇒ Perinatal exposure to passive smoke and aeroallergens



What precipitates (“triggers”) asthma episodes (“attacks”) in children?

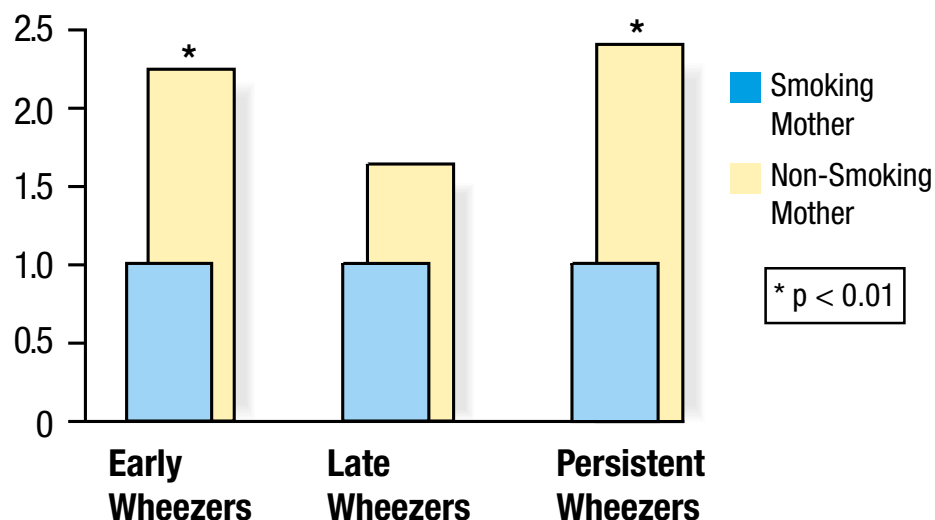
- Viral upper respiratory infections
- Exposure to environmental irritants and allergens
 - ⇒ Tobacco smoke, wood smoke
 - ⇒ House-dust mites
 - ⇒ Animal proteins (pets)
 - ⇒ Cockroaches
 - ⇒ Fungi/molds
- Exercise
- Aggravating conditions not appropriately treated (e.g., rhinitis, sinusitis, gastroesophageal reflux)
- Stress and strong emotional expression (e.g., laughing and crying)

In children over 5 years of age, asthma is frequently associated with allergy.

- Approximately 70% to 90% of children with asthma have allergy (i.e., positive skin tests).
- Some children with asthma may have “unrecognized” allergy.
- Some children with asthma do not become allergic.
- Some children with allergies do not develop asthma.

Maternal smoking significantly increases the likelihood of wheezing in childhood.¹

Odds ratio of wheezing at age 6 yrs



¹Martinez. NEJM 1995; 332:133-138.

50% to 80% of children with asthma develop symptoms (coughing, wheezing, shortness of breath or rapid breathing, chest tightness) before the age of 5 years.

Young children who develop persistent asthma are more likely to have:¹

- Increased serum IgE at 9 months.
- Atopic dermatitis and rhinitis (unrelated to URI) during their first year.
- Severe lower respiratory infections requiring hospitalization.
- Diminished airway function (as measured by spirometry) at 6 years.

The *most common cause* of wheezing in infants and young children is viral upper respiratory infections *BUT* the strongest *predictor* for wheezing continuing into asthma is *atopy*.

References

- Arshad SH, Hide DW. Effect of environmental factors on the development of allergic disorders in infancy. *J Allergy Clin Immunol* 1992; 90:235-241.
- ATS Update: Future directions for research on diseases of the lung. *Am J Respir Crit Care Med* 1998; 158:320-334.
- Beckett WS, Belanger K, Gent JF, et al. Asthma among Puerto Rican Hispanics: a multi-ethnic comparison study of risk factors. *Am J Respir Crit Care Med* 1996; 154:894-899.
- Beeber SJ. Parental smoking and childhood asthma. *J Pediatr Health Care* 1996; 10:58-62.
- Brand PL, Duiverman EJ, Postma DS, et al. Peak flow variation in childhood asthma: relationship to symptoms, atopy, airways obstruction and hyperresponsiveness. *Eur Respir J* 1997; 10:1242-1247.
- Busse WW, Banks-Schlegel SP, Larsen GL. Effects of growth and development on lung function: models for study of childhood asthma. *Am J Respir Crit Care Med* 1997; 156:314-319.
- Busse WW, Gern JE. Viruses in asthma. *J Allergy Clin Immunol* 1997; 100:147-150.
- Busse WW, Lemanske RF Jr, Stark JM, Calhoun WJ. The role of respiratory infections in asthma. In: Holgate ST, Austen KF, Lichtenstein LM, Kay AB, eds, *Asthma: Physiology, Immunopharmacology, and Treatment*. London: Academic Press, 1993; 26:345-353.
- Call RS, Smith TF, Morris E, Chapman MD, Platts-Mills TAE. Risk factors for asthma in inner city children. *J Pediatr* 1992; 121:862-866.
- Call RS, Ward G, Jackson S, Platts-Mills TAE. Investigating severe and fatal asthma. *J Allergy Clin Immunol* 1994; 94:1065-1072.
- Chen Y, Rennie DC, Dosman JA. Influence of environmental tobacco smoke on asthma in nonallergic and allergic children. *Epidemiology* 1996; 7:536-539.
- Childhood asthma - all that wheezes is not inflammation (editorial). *Clinical Exp Allergy* 1997; 27:991-994.
- Christie G, Helms P. Childhood asthma: What is it and where is it going. *Thorax* 1995; 50:1027-1030.
- Doull IJ, Holgate ST. Asthma: early predisposing factors. *Brit Medical Bulletin* 1997; 53:71-80.
- Ehrlich RI, DuToit D, Jordaan E, et al. Risk factors for childhood asthma and wheezing. Importance of maternal and household smoking. *Am J Respir Crit Care Med* 1996; 154:300-307.
- Frischer T, Kuehr J, Meinert R, et al. Maternal smoking in early childhood: a risk factor for bronchial responsiveness to exercise in primary-school children. *J Pediatr* 1992; 121:17-22.
- Gibson PG, Wlodarczyk JW, Hensley MJ, et al. Epidemiological association of airway inflammation with asthma symptoms and airway hyperresponsiveness in childhood. *Am J Respir Crit Care Med* 1998; 158:36-41.
- Glass J, Archer LNJ, Adams W, Simpson H. Nebulised cromoglycate, theophylline, and placebo in preschool asthmatic children. *Arch Dis Childhood* 1981; 56(8):648-651.
- Gortmaker SL, Walker DK, Jacobs FH, Ruch-Ross H. Parental smoking and the risk of childhood asthma. *Am J Public Health* 1982; 72:574-579.
- Grol MH, Gerritsen J, Postma DS. Asthma from childhood to adulthood. *Allergy* 1996; 51:855-869.
- Harris JR, Magnus P, Samuelsen SO, Tambs K. No evidence for effects of family environment on asthma. A retrospective study of norwegian twins. *Am J Respir Crit Care Med* 1997; 156:43-49.
- Henderson FW, Henry MM, Ivins SS, et al. Correlates of recurrent wheezing in school-age children. The physicians of Raleigh Pediatric Associates. *Am J Respir Crit Care Med* 1995; 151:1786-1793.
- Heymann PW, Rakes GP, Hogan AG, Ingram JM, Hoover GE, Platts-Mills TAE. Assessment of eosinophils, viruses and IgE antibody in wheezing infants and children. *Internat Arch Allergy Appl Immunol* 1995; 107:380-382.
- Jenkins MA, Hopper JL, Bowes G, Carlin JB, Flander LB, Giles GG. Factors in childhood as predictors of asthma in adult life. *BMJ* 1994; 309:90-93.
- Kay J, Mortimer MJ, Jaron AG. Do both paternal and maternal smoking influence the prevalence of childhood asthma? A study into the prevalence of asthma in children and the effects of parental smoking. *J Asthma* 1995; 32: 47-55.
- Kemp T, Pearce N, Fitzharris P, et al. Is infant immunization a risk factor for childhood asthma or allergy? *Epidemiology* 1997; 91:45-55.
- Koenig JQ, Larson TV, Hanley QS, Rebolledo V, Dumler K, Checkoway H, et al. Pulmonary function changes in children associated with fine particulate matter. *Environmental Research* 1993; 63:26-38.
- Kuehr J, Frisher T, Meinert R, et al. Sensitization to mite allergens is a risk factor for early and late onset of asthma and for persistence of asthmatic signs in children. *J Allergy Clin Immunol* 1995; 95(3):655-662.
- Landau LI. Natural history of childhood asthma. *Ped Pulmonol* 1995; 11:30-31.
- Landau LI. Respiratory infections and wheezing in children. *Current Opin in Ped* 1996; 8:3-5.

- Martinez FD. Definition of pediatric asthma and associated risk factors. 1997; 15:9-12.
- Martinez FD. Maternal risk factors in asthma. 1997; 206:233-239.
- Martinez FD. Viral infections and the development of asthma. *Am J Respir Crit Care Med* 1995; 151:1644-1647.
- Martinez FD, Wright AL, Taussig LM, et al. Asthma and wheezing in the first six years of life. *N Engl J Med* 1995; 332:133-138.
- Nelson RP JR, DiNicolo R, Fernandez-Caldas E, et al. Allergen-specific IgE levels and mite allergen exposure in children with acute asthma first seen in an emergency department and in nonasthmatic control subjects. *J Allergy Clin Immunol* 1996; 98:258-263.
- Nelson BV, Sears S, Woods J, et al. Expired nitric oxide as a marker for childhood asthma. *J Pediatr* 1997; 130:423-427.
- O'Hollaren MT, Yunginger JW, Offord KP, et al. Pulmonary function changes in children associated with fine particulate matter. *N Engl J Med* 1991; 324:359-363.
- Oswald H, Phelan PD, Lanigan A, et al. Childhood asthma and lung function in mid-adult life. *Pediatr Pulmonol* 1997; 23:14-20.
- Peat JK, Tovey E, Toelle BG, et al. House dust mite allergens: a major risk factor for childhood asthma in Australia. *Am J Respir Crit Care Med* 1996; 153:141-146.
- Pollart SM, Chapman MD, Fiocco GP, Rose G, Platts-Mill TAE. Epidemiology of acute asthma: IgE antibodies to common inhalant allergens as a risk factor for emergency room visits. *J Allergy Clin Immunol* 1989; 83:875-882.
- Pullan CR, Hey EN. Wheezing, asthma, and pulmonary dysfunction 10 years after infection with respiratory syncytial virus in infancy. *Brit Med J* 1982; 284:1665-1669.
- Romieu I, Meneses F, Ruiz S, et al. Effects of air pollution on the respiratory health of asthmatic children living in Mexico City. *Am J Respir Crit Care Med* 1996; 383:247-250.
- Roorda RJ, Gerritsen J, Van Aalderen WM, et al. Risk factors for the persistence of respiratory symptoms in childhood asthma. *Am Rev Respir Dis* 1993; 148:1490-1495.
- Roorda RJ. Prognostic factors for the outcome of childhood asthma in adolescence. *Thorax* 1996; 51:S7-S12.
- Ross S, Godden DJ, Abdalla M, et al. Outcome of wheeze in childhood: the influence of atopy. *Eur Respir J* 1995; 8:2081-2087.
- Schaubel D, Johansen H, Dutta M, et al. Neonatal characteristics as risk factors for preschool asthma. *J Asthma* 1996; 33:255-264.
- Schmitzberger R, Rhomberg K, Buchele H, et al. Effects of air pollution on the respiratory tract of children. *Pediatr Pulmonol* 1993; 15:68-74.
- Sears MR, Holdaway MD, Flannery EM, Herbison GP, Silva PA. Parental and neonatal risk factors for atopy, airway hyper-responsiveness, and asthma. *Arch Dis Child* 1996; 75:392-398.
- Sears MR. Risk factors for airway hyperresponsiveness in childhood asthma. *Ped Pulmonol* 1995; 11:42-43.
- Sears MR, Burrows B, Flannery EM, Herbison GP, Holdaway MD. Atopy in childhood. I. Gender and allergen related risks for development of hay fever and asthma. *Clin Exp Allergy* 1993; 23:941-948.
- Sears MR, Burrows B, Herbison GP, Holdaway MD, Flannery EM. Atopy in childhood. II. Relationship to airway responsiveness, hay fever, and asthma. *Clin Exp Allergy* 1993 23:949-956.
- Sears MR, Herbison GP, Holdaway MD, et al. The relative risks of sensitivity to grass pollen, house dust mite, and cat dander in the development of childhood asthma. *Clin Exp Allergy* 1989; 19:419-424.
- Soyseth V, Kongerud J, Boe J. Postnatal maternal smoking increases the prevalence of asthma but not of bronchial hyperresponsiveness or atopy in their children. *Chest* 1995; 107:389-394.
- Sporik R, Holgate ST, Cogswell JJ. Natural history of asthma in childhood - a birth cohort study. *Arch Dis Child* 1991; 66:1050-1053.
- Sporik R, Holgate ST, Platts-Mills TAE, Cogswell JJ. Exposure to house-dust mite allergen (Der p1) and the development of asthma in childhood. A prospective study. *N Engl J Med* 1990; 323:502-507.
- Stoddard JJ, Miller T. Impact of parental smoking on the prevalence of wheezing respiratory illness in children. *Am J Epidemiology* 1995; 141:96-102.
- Strunk RC. Asthma deaths in childhood: Identification of patients at risk and intervention. *J Allergy Clin Immunol* 1987; 60:472-477.
- Taylor WR, Newacheck PW. Impact of childhood asthma on health. *Pediatrics* 1992; 90:657-662.
- Ulrick CS, Backer V, Dirksen A, Pedersen M, Kock C. Extrinsic and intrinsic asthma from childhood to adult age: a 10-yr follow-up. *Respiratory Medicine* 1995; 89:547-554.
- von Mutius E. Progression of allergy and asthma through childhood to adolescence. *Thorax* 1996; 51:S3-S6.
- Weiss ST. Diet as a risk factor for asthma. *Ciba Foundation Symposium* 1997; 206:244-257.
- Wieringa MH, Weyler JJ, VanBastelaer FJ, et al. Higher asthma occurrence in an urban than a suburban area: role of house dust-mite skin allergy. *Eur Respir J* 1997; 10:1460-1466.
- Zeiger RS. Dietary manipulations in infants and their mothers and the natural course of atopic disease. *Pediatr Allergy Immunol* 1994; 5:33-43.